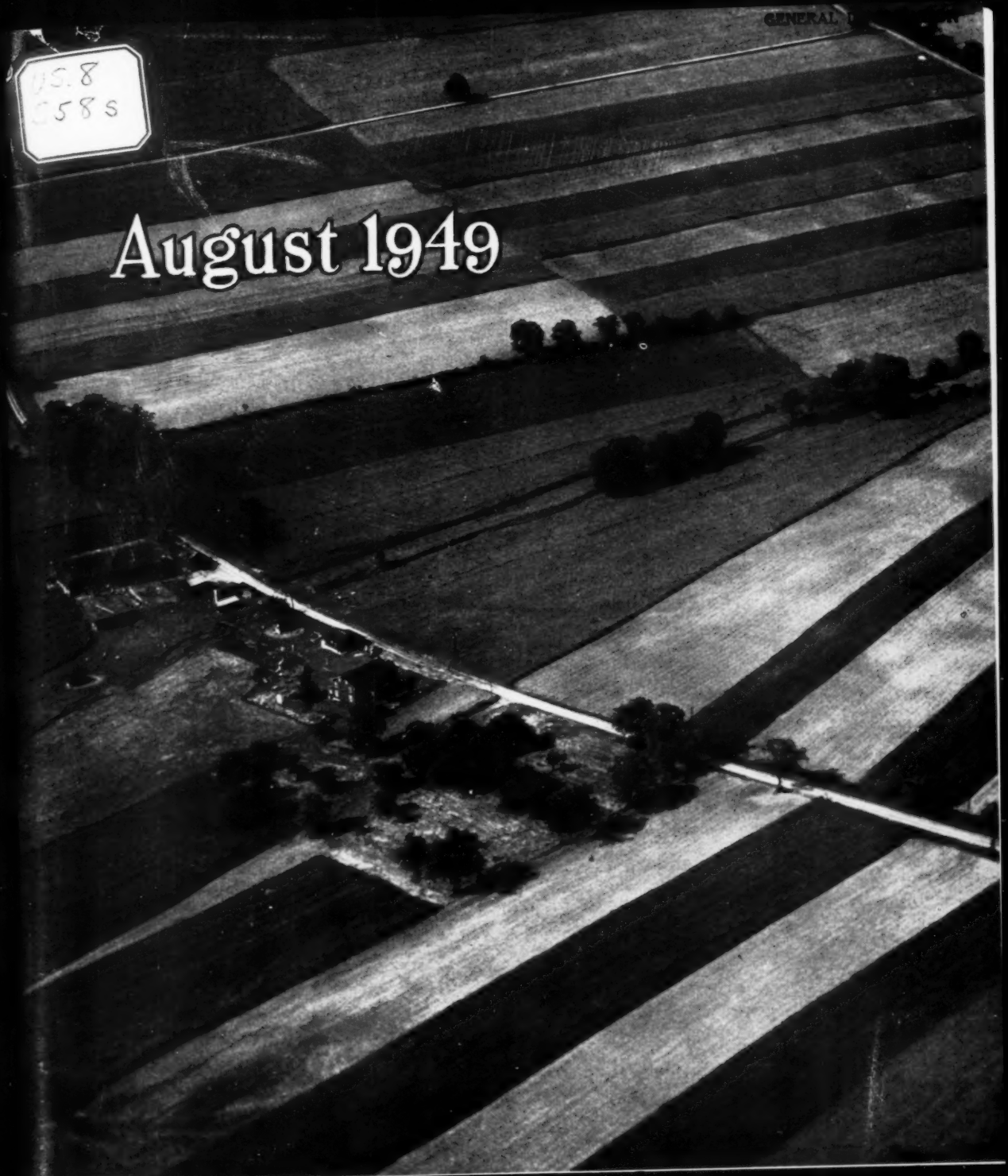
August 1949



SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

SOIL CONSERVATION •

AUGUST - 1949
VOL. XV - NO. 1

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SECRETARY OF AGRICULTURE

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ISSUED BY SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

☆ THIS MONTH ☆

WELLINGTON BRINK
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Art Work by
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SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with approval of the Director of the Budget. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

10 CENTS PER COPY **$1 PER YEAR**
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FIRE INSURANCE.—When Thomas W. Wilson, cooperator in the Prince Georges Soil Conservation District, built a spring-fed pond on his dairy farm near Largo, Md., about 2 years ago, fire protection was the main thing he had in mind. He got results a recent Sunday afternoon when smoke appeared in a barn where 24 cows were being milked. Ten fire-fighting companies from nearby communities responded. Five started to pump from the 1¼ million gallons of water in a ½-acre pond of 10-foot depths. Seven hours later the last of the pumpers quit throwing water and left.

"Three barns and several smaller buildings valued at more than $12,000 were saved. Without the pond and its water, all of them likely would have been lost. Three days later the water in the pond was back to normal level," Wilson says. He spent $850 for the pond. In one afternoon and evening he got it all back, with interest.

INCENTIVE.—In Vermont the Poultney-Mettawee Soil Conservation District supervisors have agreed to pay their bulldozer operator a $100 bonus for this year if he operates the bulldozer 1,000 pay-hours during the season, a $200 bonus if he goes over 1,100 pay-hours, and a $300 bonus if he exceeds 1,300 pay-hours.

FRONT COVER.—This is the interesting pattern taken by conservation on the gently sloped fields owned by Ray Phillips near Dalmatia, in Stone Valley, Northumberland County, Pa. The photo was made by Hermann Postlethwaite.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Typical ranch scene on east coast of Molokai. It makes obvious why range conservation is essential to the livestock industry of the Hawaiian Islands.

By J. H. CHRIST

JAPANESE bombs in 1941 brought an abrupt halt to soil conservation work on the Hawaiian Islands. But they failed to obliterate the interest in soil conservation aroused a few years before by Dr. N. E. Winters and his technical staff of the Soil Conservation Service. Hawaiian pineapple and sugarcane producers, livestock operators, and truck farmers were ready to move ahead with the conservation job as soon as the smoke cleared away.

I made my first inspection trip to the territory last April and found that the soil conservation idea has spread to an extent that bodes well for the future of Hawaiian agriculture.

NOTE.—The author is regional conservator, Soil Conservation Service, Portland, Oreg.

In many ways my visit was a bewildering experience. I learned about flies that cause erosion, and about a new conservation practice known as "pineapple-stump mulch." Here, too, I saw soil conservation as a byproduct of sugar refining, rotation grazing by the simple expedient of turning a faucet, and soils that could well furnish the pigment for paint. I learned of areas that had become unprofitable for pineapple and sugarcane production. And I found a widespread determination on the part of land users, both large and small, to prevent any further inroads on their limited supplies of productive land.

Evidence of the move toward soil conservation is apparent throughout the Islands. Molokai, one of the large pineapple-producing islands in the territory, is now a complete soil conservation district. The Olinda-Kula Soil Conservation Dis-

trict on the island of Maui and the Waimanalo District on Oahu are forerunners of numerous other districts now in formation under the districts law recently adopted by the Territorial Legislature.

The western end of Molokai is largely occupied by a large livestock enterprise, the Molokai Ranch Co. In former years, this ranch was stocked with as many as 17,000 head of sheep. During certain seasons of the year vicious horn flies attacked the sheep and drove them to the windy points and open faces of the island. Here the animals stamped the ground to kick up dust which kept the flies away. Ranch officials told me that much of the erosion now in evidence was directly attributed to this activity.

My introduction to the unique pineapple-stump mulch also came on Molokai. For many years pineapple producers have grappled with the problem of what to do with the heavy, coarse stumps remaining from pineapple harvest. More than a year ago I had heard of an implement that completely buries the stumps following harvest and I was eager to see it in operation. I was told, however, that developments on the implement had been discontinued in favor of a new machine then being tested which would windrow the stumps on the surface in the inter-row area, fertilize the soil, apply soil disinfectant, and lay paper for subsequent pineapple planting.

Although the machine was not available for inspection, officials of a canning company showed me photographs of the implement and described its operation. They showed me tests where moisture conditions under the stump mulch were as favorable as under the paper. This practice provides for an immediate planting after the crop has been removed instead of waiting a 12-month period for the pineapple residues to disintegrate. Service technicians are unusually optimistic as to the value of the practice for both soil and water conservation.

As in the case of numerous other soil conservation practices coming into use in the Islands, pineapple-stump mulch appears to be a potential money-saver as well as soil-saver. Two large packing companies are confident that stump mulch will shortly make it possible to add another full crop to the present production schedules. Both companies are taking active part in the affairs of the Molokai Soil Conservation District and are carrying forward extensive independent research at considerable expense.

After my experience with horn flies that cause erosion and pineapple-stump mulch, I was hardly surprised to find that soil conservation here is sometimes actually a byproduct of sugar refining. The unusual was becoming commonplace. At the Waialua sugar refinery, on the island of Oahu, a large settling tank measuring 120 feet in diameter has been constructed to catch the water used for washing cane brought in from the fields. Inasmuch as large quantities of soil cling to the cane, silt accumulation in the tank is considerable.

Soil-saving terraces constructed before the war.

Litter left on field after hand-cutting sugarcane. Under the common "grab" method of harvesting, the cane plants with large quantities of soil clinging to the roots are hauled directly to the refinery, where in some cases the soil is being recovered and returned to the fields.

A huge rotating arm collects this silty sludge from the bottom and conveys it to an adjacent basin. From there, it is very carefully returned by truck to portions of fields most seriously eroded or in need of soil additions.

A soil-recovery plant identical to the one operated by the Waialua refinery is nearing completion at the Ewa Sugar Plantation, and on the island of Maui, I later encountered yet another such installation.

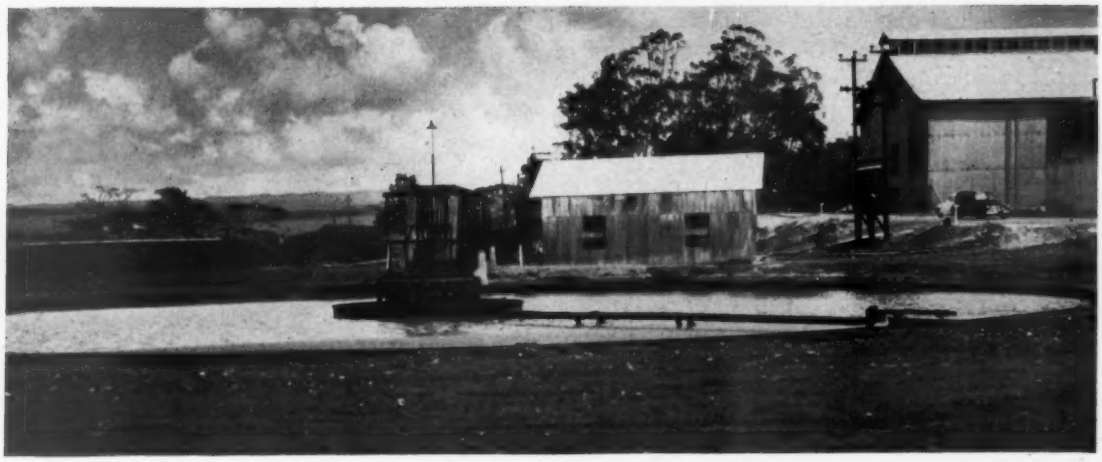
The installations, which represent investments running to $100,000 and more, are known as "hydroseparators." Their original purpose was to remove soil and debris from the wash water so that it could be reused for irrigation without clogging the irrigation systems. After a short period, however, their value for soil recovery also became apparent. Estimates of the amount of soil thus saved ranged as high as 35 to 40 acre-feet per year for installations on Oahu. Water savings are put at approximately 6,000,000 gallons during a cane-harvesting season. A further benefit of great importance is the elimination of beach pollution which has long been a problem to health authorities on the Islands.

Although pineapple production dominates the agriculture of Molokai, there is considerable livestock on the steeper slopes and other lands unsuited to pineapple culture. The Puuohoku Ranch on the northeast coast is fairly typical of much of the range land on the Islands. It is well managed, with ample stock water provided at strategic points through a vast network of pipes laid on the surface of the ground. Rotation grazing is accomplished by the simple expedient of turning off a faucet which stops the water at any particular place and forces stock to move to another pasture. Large areas of range land in the Territory need improving and efforts toward this end are being made by many far-sighted ranchers.

Throughout the Territory, there is need for improving ranges and pastures with better forage plants. Good progress is being made in selecting the more desirable species and in determining the conditions under which they are adaptable.

Soil structures are highly complex. On Oahu, many of the soils are derived from lava, others from coral, and still others from a combination of the two. Large areas are exceedingly stony and frequently very shallow. Those derived primarily from coral appear to have a high clay fraction that causes them to plow up in hard, angular blocks. For the pineapple and sugarcane producers this is of little consequence. But for the small operator with light equipment, it greatly increases the difficulty of farming.

From my brief examination of the soils of Molokai, I learned of a farming hazard that was new to my experience. The soils here are among the reddest I have ever encountered. Farmers and visitors must be careful to soak their clothing in cold water before putting it in the family wash. Otherwise, the red pigment from the soil forms a very effective and permanent dye. The pigment sets quickly in hot water.



Hydroseparator in operation at a large refinery on the island of Oahu. Settling basin measures 120 feet across; total cost of installation, approximately $100,000.

Agriculture on the island of Kauai at the extreme northern end of the Hawaiian chain offers a striking contrast to that of the lower islands. While considerable acreage is devoted to pineapple and sugarcane, the agriculture of the island seems more nearly geared to meet local needs. Diversified agricultural enterprises such as truck gardening, fruit production, dairying, beef cattle and related activities are common.

Erosion on Kauai is a problem of immediate concern of both large and small operators. Terrace systems, installed in the past, have not functioned well due to changes resulting from mechanization and there is need for modification of terrace design.

There is evidence of land abandonment in Hawaii because of soil losses by erosion. Some of this is due to the natural unsuitability of the land for the crops grown, as well as from the practices used in growing the crops. The topography is such that conservation treatment is a first requirement for a permanent agriculture. There is little land now available for development for cultivated crops. This limitation in itself is sufficient to enlist the efforts of all operators toward conservation of the lands now in use.

The need for technical assistance in applying conservation work is no less acute than in the continental United States. Soil conservationists now working in the Islands are heavily overburdened. Requests for technical guidance far exceed the abiljty to meet them. In some districts, operators unwilling to wait for assistance are installing conservation measures copied from a neighbor. In one instance I found terraces built in this fashion which unfortunately drained the wrong way.

As new districts form in the Territory, there is reason to believe that Hawaiian agriculture will quickly make up for the time lost during the war as it speeds ahead on soil conservation.

UNITED NATIONS SCIENTIFIC CONFERENCE.—The United Nations Scientific Conference on the Conservation and Utilization of Resources will open a 3-week session at Lake Success on August 17.

Among those from the Soil Conservation Service who will appear on the program are: H. H. Bennett, chief; J. C. Dykes, assistant chief; L. A. Jones, chief, water conservation and disposal practices; F. G. Renner, chief, range division; and E. H. Graham, chief, biology division, Washington, D. C.; T. S. Buie, regional conservator, Spartanburg, S. C.; and F. L. Duley, research, Lincoln, Nebr.

More than 400 scientific papers will be discussed at 60 section meetings of the conference where specialists from all over the world will exchange technical experience on specific subjects concerning the conservation and use of minerals, fuel and energy, land, water, forests, and wildlife and fish.

In addition, the conference will hold some 18 plenary meetings to discuss the inter-relationship of these specific resources and techniques. In the preparation of papers and in the discussions, emphasis will be placed on "the economic costs and benefits" of improved resources techniques.

Outstanding scientists, experts, and technicians from more than 70 countries have been invited to attend this first scientific conference to be held by the United Nations.

A proud Chief assembles his Honor Award winners in his office following the ceremony on the Monument Grounds. Standing behind him, left to right: Chandler, Heath, McCulloch, Flanagan, McLaughlin, and Allred.

TOP SELECTIONS OF 1949.—Six individual employees of the Soil Conservation Service were accorded national recognition for outstanding contributions to American agriculture at the annual Honor Awards Ceremony of the Department of Agriculture in May. Presentation was made by Secretary Brannan, following an address by Senator Elmer Thomas, before a large and enthusiastic audience in the outdoor Sylvan Theater in Washington, D. C.

Similar awards for group achievements will be made later to the Broken Arrow (Okla.) Work Unit and the Hamilton (Tex.) Work Unit at their field headquarters offices.

Superior Service Awards, each attested by certificate, medal, and lapel button went to the following:

Berten W. Allred, Fort Worth, Tex. For outstanding service to agriculture in the development of improved procedures and working methods in the field of range conservation which have resulted in significant savings in money and time of personnel.

Verlin N. Chandler, Tucson, Ariz. For unusual skill, ingenuity, and accomplishment in reconstructing and modifying standard equipment, ranging from scientific to heavy farm equipment, required for carrying out improved methods in range cover and erosion control in the semiarid areas of the Southwest.

Robert C. Flanagan, Senatobia, Miss. For outstanding leadership and competence in developing a highly effective soil conservation program in Tate County, Miss.

Maurice E. Heath, Big Flats, N. Y. For outstanding service to agriculture through his assistance in helping to find and isolate the southern type of bromegrass strains and for his efforts in further developing vegetative control in soil conservation.

Allan W. McCulloch, Portland, Oreg. For outstanding achievement in the field of irrigation.

Walter Wesley McLaughlin, Berkeley, Calif. For outstanding achievement in the field of irrigation, national and international.

PIN THOSE ISLANDS DOWN!—Ernest G. Holt, research specialist of the Soil Conservation Service, has begun a year's assignment with the Navy as conservation officer, Trust Territory of the Pacific Islands. Friends may reach him at the following address: Staff, DepHiComTerPacIs, Navy No. 926, % Fleet Post Office, San Francisco, Calif.

10-YEAR CROP.—A Series E Savings Bond purchased at a cost of $750 will grow to $1,000 in 10 years, come wind, come rain. How much does it take in farm products to make this investment in the future? Someone has worked out an interesting table on this, based on average prices received by farmers:

Product	*1932 yearly average*	*1939 yearly average*	*1949 February*
Hogs (200-pound)	112	60	20
Cattle (1,000-pound)	18	10	4
Milk (hundredweight)	586	446	173
Eggs (cases)	176	144	60
Wheat (bushels)	1,964	1,085	386
Corn (bushels)	2,374	1,321	670
Cotton (bales)	23	16	5
Tobacco (pounds)	7,143	4,871	1,531
Potatoes (bushels)	1,974	1,076	436
Apples (bushels)	1,229	1,172	253

LITTLE GIRL IN MAN-SIZE JOB

BY HUGH F. EAMES

MAKING SOIL CONSERVATION SURVEYS for the Soil Conservation Service calls for a husky, long-legged man who can get over a lot of acres on foot and twist a 6-pound soil auger 2 or 3 feet into the ground and pull it out with samples at least 100 and maybe 200 times a day.

It is a back-breaking one-man job, even when one knows how to apply the coordinated strength of one's whole body in the auger-pulling effort. Occasionally, as when making deeper borings in the site for a farm pond, there may be need for the help of another man in handling the auger and its extension, but most of the time one works alone.

But it's not too tough a job for Mary Baltz. For 4 years now, in New York's Oneida, Madison, and Lewis Counties, the 120-pound, 5-foot 3-inch, 25-year-old Mary has been doing this kind of thing day after day and week after week, in all kinds of weather and at all seasons of the year. And, regularly, she has been earning a very high efficiency rating for the quality and quantity and all-around acceptability of her work.

When Mary Baltz, majoring in agronomy, came out of college in 1945, after 3 years at Antioch College, and a year of special study at Cornell University, with a degree and some extra training received elsewhere, she picked soil conservation surveying with SCS as the job she wanted most to do. Enthusiasm for it had been engendered 10 years earlier when an uncle, Harold C. Squires of Lake Keuka, N. Y., a vineyardist, took her to an open house at the agricultural experiment station at nearby Geneva. There she became sold on the idea of some day working with soils. Supervisors tried to ease her into an office job, but she insisted on field work and got it. They have never been sorry that they let her have her way. Mary has never been sorry that she was a bit stubborn about getting field work.

In this central New York assignment Mary Baltz has been doing all the conservation surveying for seven farm planners who work with the soil conservation districts there. It's a heavy work load, because 291 farmers asked for assistance from the 3 districts in 1948. Since districts were organized under State law, 1,581 farmers have been assisted with complete farm conservation plans. In developing each of these plans, the job that Mary Baltz does is the first requirement. She has not made all of the conservation surveys involved, but she has done the basic work for most of the plans and for many others that will be developed later. Because the work load is so heavy, another surveyor has recently been assigned to handle the work for the Lewis County planner. Mary will do the surveying for the six in Madison and Oneida Counties.

Soil conservation surveying is a complicated task in this three-county area because the soil scientist—that's what Mary is officially designated—is required to deal with an unusually large number of soil types. There are six major land-resource areas, each with different types of soil-forming rocks. Soil scientists, whether they are "splitters" or "lumpers," have a lot of difficulty with these many varying types. Mary Baltz has been unusually successful because of her ability to sift out quickly those having particular significance to agriculture.

Mary works out of the Madison County Soil Conservation District office. There she did her first field work on the highly productive Canastota "muck" areas, among the best in the country. There she had the advantage of early training under the watchful eyes of Jim McDonald, an old-timer who made a special effort to see that Mary got started right. Jim is working for SCS in the southeast now, but he still smiles broadly when you mention Mary Baltz. He "always knew she would come through with flying colors."

Miss Baltz is a native of Chickasha, Okla., but grew up in Baltimore, where she was graduated from Eastern High School. After 3 years' study at Antioch, she took a year's leave of absence and entered Cornell for special courses in agronomy, after which she went to work for SCS. On the basis of all this work and completion of other requirements while working for SCS, she received her Antioch degree in 1946.

Antioch has a program in which theoretical study is alternated with practical work. In the practical phase of this program the college obtains jobs that are generally closely related to the field in which the student is majoring. During this process Mary, after her freshman year, worked for a year as a technician at the Connecticut Agricul-

NOTE.—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.

This is Mary Baltz

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tural Experiment Station where she got experience in quick soil-testing, analysis of forest-soil samples, testing of plant-tissue samples for nutrients by a colorimetric method, and field work with forest soils.

Next year she worked 3 months in the master analysis division of the United States Weather Bureau at Washington, D. C. She plotted weather data on maps much as she was later to plot land conditions on aerial maps. Later on, the same year, she got herself a 4-month job, still under the college program, at the Eastern States Farmers' Exchange at West Springfield, Mass., where she did quick-testing analyses of soil and hay samples.

"All business; no foolishness" is a phrase that has been applied to Mary Baltz. It helps you understand how she is carefully plotting her course toward an end. It explains why she studied engineering drawing at the New Haven YMCA Junior College in 1943, and why she has taken night school courses in photogrammetry and logic at Syracuse University. It also explains why steady advancements with ever-increasing responsibilities have come to Mary Baltz since she started with SCS as a soils aid, and helps one understand why she has become a P–2 soil scientist—and the only woman in the Nation doing soil conservation surveying for SCS.

Studying, identifying, classifying, and recording soil, slope, erosion, and land-use conditions in the field is not everything that Mary does. When the snow and ice are on the ground and fieldwork cannot be done by anyone, and at other times when she can temporarily shift from fieldwork, Mary has been doing particularly exacting work in reconciling data gathered in independent surveys previously made by others in parts of the area, and transferring it to the standard legend set up for SCS use in the three districts. For several months she has been supervising the work of a 4-girl map-measuring unit at the Canastota office. The purpose is to acquire acreage figures from conservation-survey maps for soil, slope, and erosion conditions in relation to different land uses. Acreages are obtained by cutting copies of these maps, weighing pieces that are alike, and converting this weight to acres. The data thus obtained are used in long-range planning for the type of conservation measures needed in an area.

Back in the days when Mary was angling for a soil conservation surveying job, there were skeptics who seriously doubted the wisdom of putting a girl to work on that kind of an assignment. It just couldn't work out for the good of Mary, or the SCS, or the farmer-cooperators, they said. But they were wrong. Through her professional ability and her thoughtfulness, courtesy, dependability, and leveling influence, Mary has been able to adjust herself to many varying conditions. With these qualities, plus her insistence that at all times she is to be considered only as a fully participating member of the team who can handle a soil auger and do the whole soil conservation surveying job as well as any other technician, Mary Baltz has established herself solidly among people with whom she works.

After nearly 4 years of experience in soil conservation surveying, what does Mary Baltz see ahead? She puts it this way:

"It seems to me that the most important single job to be done now in agriculture is the conserving of soil resources through correct land use and other correlated measures.

"The attitude of farmers toward soil and water conservation and good land use is rapidly changing. During the past few years, particularly in northern Madison County, I have noted this shift in opinion. Farmers used to ask for help mainly in drainage work or pasture clearing. Now they want to discuss and try out strip cropping, diversions, etc. I believe the publicity given to soil conservation farming by newspapers, magazines, radio, and the Department of Agriculture programs has had a big part in bringing this change in attitude. I like the work I am doing, and have no plans for the immediate future except to stay with my job, because I think it is important."

GOOD IDEA CATCHES ON.—The Upper West Red River and Upper Sabine Soil Conservation District (La.) boards of supervisors have voted to supply new cooperators with a 1-year subscription to SOIL CONSERVATION Magazine. The plan is to have a bank, farm-implement dealer, seed store, or other friends in town agree to underwrite the project. The first copy of the magazine mailed to a new subscriber is to have attached to it a letter of greeting and explanation.

SCIENCE STUDIES A Gully

By

RUSSELL WOODBURN

Erosion has bitten away the soil and left the plugs, at least some of them. Others have been tumbled downhill and been broken or battered to pieces by rushing waters.

FOR SPECTACULAR soil erosion on agricultural land, it is hard to find any place in the United States that excels the hill country of north central Mississippi. In the Little Tallahatchie watershed, lying in the middle of this area, 294,000 acres have been forced out of cultivation by soil erosion since white man began farming there scarcely a century ago. That's about one-third of the entire watershed. Some 75,000 acres have been ruined for agriculture by large, deep gullies.

NOTE.—The author is project supervisor, Office of Research, SCS, State College, Miss.

General view of gully immediately after plugging.

Typical air view of the land under study. This is decay of land at its worst—a countryside pockmarked with creases and cuts which lengthen and spread with every lash of the weather.

Besides destroying this vast acreage of sloping land, major gullies have produced enough sand to fill literally hundreds of miles of minor waterways and tributary stream channels. Because the capacity of channels has been so greatly reduced, the runoff from a ½-inch rain now leads to damaging floods. Flood damage, indeed, now occurs on about 65 percent of the 71,800 acres of bottom land in the Little Tallahatchie watershed. In a normal year about 15 floods occur somewhere in the watershed, of which 4 normally take place during the growing season. The Department of Agriculture's flood-control survey of the Little Tallahatchie in 1940 estimated the annual floodwater damage to crops at $301,000 and the damage from infertile overwash and swamping on agricultural bottom lands at $591,000. Increased agricultural prices and land values today bring the average annual losses to more than double these figures.

A major part of the flood and sedimentation costs can be traced directly to the severe gullying. Sand is moving rapidly out of the major gullies. When it reaches the lower gradients of the minor waterways and stream channels, the flow can no longer transport it in such large amounts. Consequently, many of the channels have been filled to a level even higher than the normal ground level. Often water now flows down along the sides of the valley, rendering all of the bottom land unfit for farming.

One of the difficulties in planning effective gully control has been the lack of data on the rate of erosion by direct slope wash within the gully. Experimental data have been obtained in many States on rates of sheet erosion, but very little information is available on the rate of soil loss from gullies alone. In order to obtain quantitative data which could be used in planning erosion-control and sediment-control measures, the Soil Conservation Service started a research study in 1936 on a typical large gully located about 3 miles northwest of Oxford in Lafayette County, Miss. This type gully is 20 to 40 feet deep and has an area of approximately seven-tenths of an acre. Practically no water flows into it, as the head of the gully is less than 100 feet from the drainage divide. Therefore, almost all of the erosion within the gully can be attributed to raindrop impact and slope wash. Lexington silt loam soil that once covered the gully was developed on a 4- to 5-foot thickness of loessal material which overlies the loosely consolidated Holly Springs sand, an extremely friable and loose-textured geologic forma-

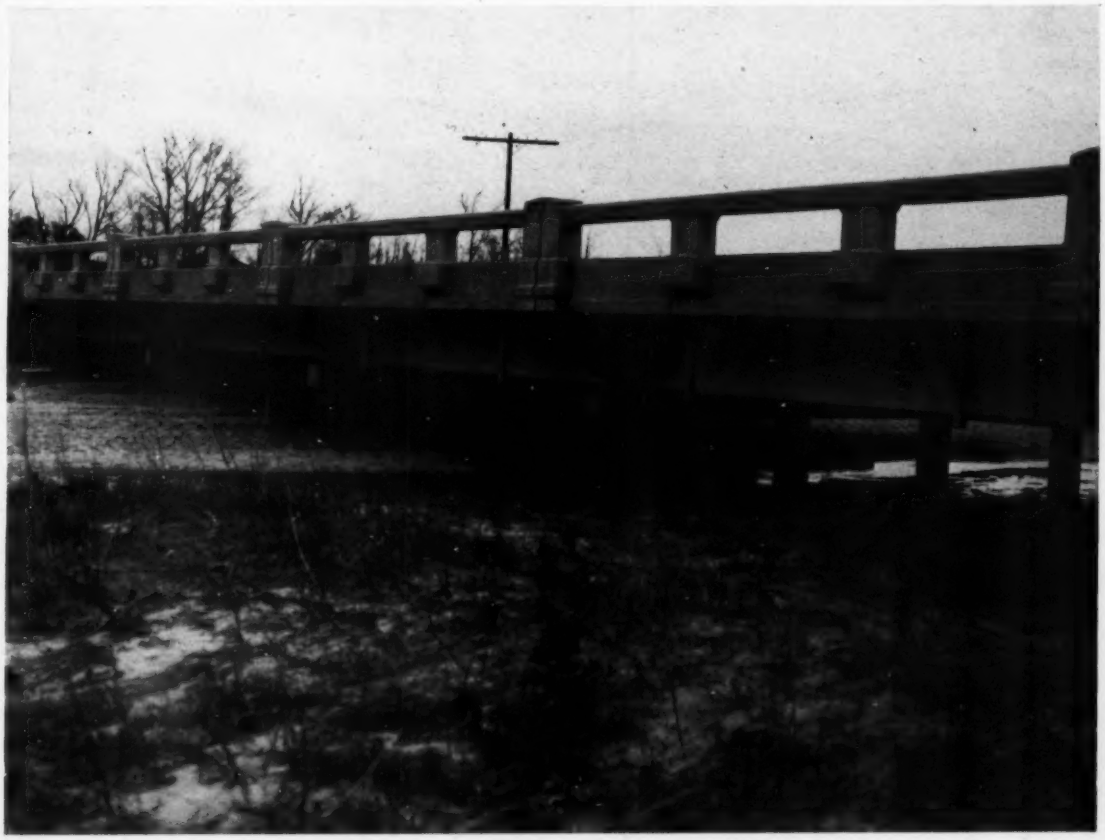
tion. Once erosion has cut through the upper layer of loess the sandy material is eroded with extreme rapidity. Often it seems to melt like sugar and flow away like grainy syrup.

As a first step in the research, a 2-foot contour map was made of the entire gully. On each 2-foot contour 4-inch diameter holes were bored to a depth of 30 inches at right angles to the gully face and at intervals of 10 feet along the contour. These holes were filled with concrete, which was carefully scraped off flush with the slope of the gully. Each of the 1,518 concrete plugs thus formed was numbered on its face. Plugs were set in the bottom of the gully as well as along the surface of the ground beyond the gully rim. The outer end of each plug thus constituted a fixed point from which the depth of soil removed in its vicinity could be measured.

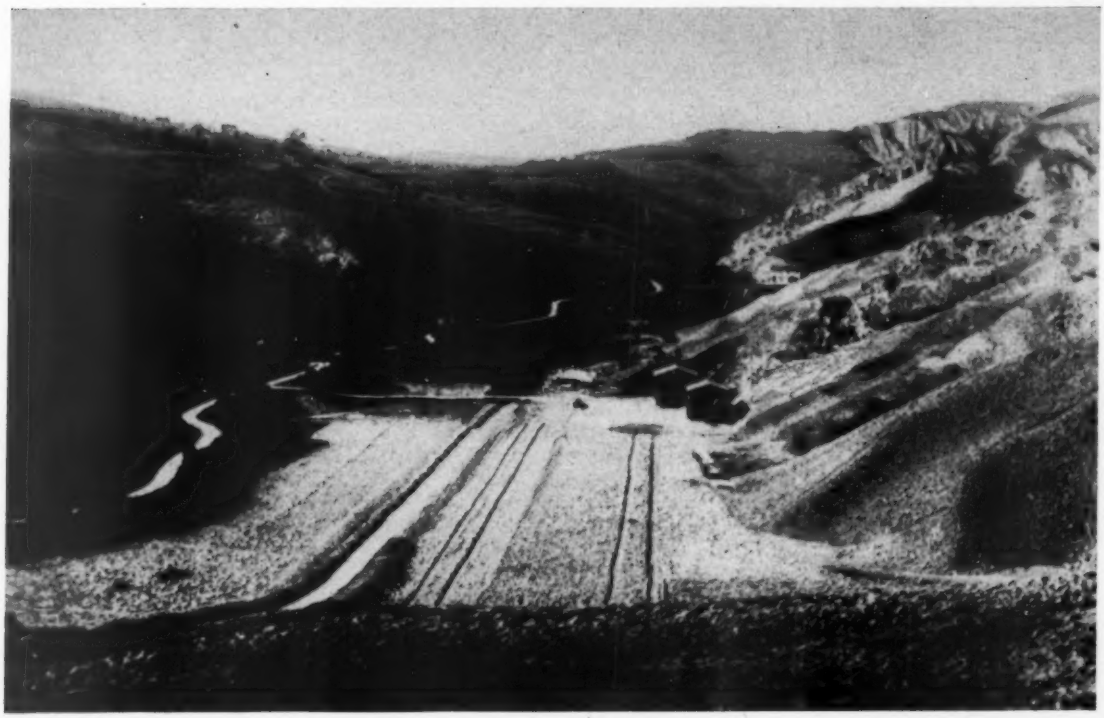
The length to which each plug protruded was measured in 1937, 1 year after installation, and again in 1939, 3 years after installation. Measurements were again made on all the surviving monuments in January 1949, 13 years after their installation. Many of the plugs were gone, which indicated an erosion of at least 30 inches at these points. From a sufficient number of surviving plugs, however, a reliable determination could be made of the total amount of soil removed.

The average width of the surface slope between contours was calculated from the area between contours and the average length of contours. This value multiplied by the mean length of protrusion above the surface of all plugs on the upper and lower contours gave the volume of soil removed in this contour interval. The calculations showed that during the first year (1936–37) 2,973 cubic feet of soil went out of the gully; in the first 3 years (1936–39) 11,478 cubic feet was removed;

(*Continued on page 22*)



Cattle and tractors crossed under Mississippi State Highway 6 at West Goose Creek until 3 years ago. Sand is now within 2 feet of bridge.



Land reclaimed by siltation upstream from earth dam. Farming practices already are being carried out. (Photo by Brisighella Mountain Basins Consortium.)

ITALY'S MAJOR LAND PROBLEM

By AUGUSTO ALFANI AND HUGH G. CALKINS

PART II

EDITOR'S NOTE.—The authors continue in this issue the fascinating and stimulative story begun in July. Part II describes in detail certain Italian land-restoration measures which in many instances are contrary to those favored in the United States. We can neither accept nor challenge them, for soils and economics and climatological conditions are sharply different from those prevailing here. This is factual reporting, well done.

AS INDICATED earlier, it is believed that most of Italy's clay formations had a covering of sandy soil, and supported forests. When the forests were cut and burned the sandy layer was washed off and tree growth was no longer able, unaided, to gain a foothold in the clay. Now the layman, looking at a stupendous example of erosion, immediately jumps to the conclusion that reforestation is the quickest and most practical solution. The conservation specialist says "no," first because Italy cannot afford to forego the use of land that can be made to produce food crops, and second, because reforestation technically is not considered a sound method of reclaiming damaged clay lands.

The technical arguments are several: It is very difficult to get a plantation started in relatively impermeable soil. Once the trees are started their deep root systems carry water to lower strata and greatly increase the danger of land slides. In order to establish a plantation on ragged slopes it is generally necessary to introduce expensive measures to stabilize the slopes; these measures are not a guarantee against future damage. To be safe, it is often necessary to resort to more or less the same costly process required to establish food crops or forage plants. Leguminous forage plants, moreover, have the advantage of improving the soil more rapidly and effectively than trees.

Briefly, the question resolves itself into making the agricultural development of each project area

the first objective, and limiting reforestation to those sites within the area where soil and other conditions are more favorable to trees than to field crops. Every watershed stands to benefit, physically and economically, from a fair proportion of forest or wood lots. One of Italy's foremost foresters considers that eucalyptus (E. rostrata) is well adapted to the raw clay lands of Sicily, but not to the colder climates of the north, where elm, ash, and cypress offer greater possibilities. Tamarisk is specically useful in connection with engineering structures in virgin clay.

A problem closely related to forestry is that of grazing. Every tenant farmer has a few cattle for work and milk and many have small bands of sheep. In the central and southern Appenines large and small sheep owners take their flocks to the mountains in the summer, and forage where they can at other seasons. All untilled areas in the clay regions are subject to indiscriminate grazing. Heavy use of grasslands weakens the vegetation and makes the land more susceptible to erosion. Cattle and sheep trails have a similar effect. The problem would be considerably lessened if grazing were controlled. In some parts of the country, improved pastures under fence alternating with cultivated crops would help. Elsewhere, the only solution seems to be to regulate the number of animals and seasons of use in accordance with a plan based on careful surveys. A lot of educational effort would be needed to overcome resistance to such a scheme.

Sodded earth dam with overflow crest normally used in Val d'Era. The spontaneous vegetation developed on the silted plain upstream from dam shows that the silted soil is fertile. (Photo by Val d'Era Reclamation Consortium).

As already noted, gullies and other waterways are controlled by series of dams which reduce the velocity of flow, impound soil washed from the hillsides, and establish a foundation on which to

build eroded slopes into useable, tillable ground.

The commonest type is the earth dam, which cannot be safely built of virgin clay. Soil which has been washed to remove colloidal material is selected, with preference for that which contains a fair amount of coarse sand. By this means there is a good chance of avoiding the formation of cracks in the dry season and hence of the intrusion of water when rains occur. The upstream and downstream slopes of the dam have grades depending on the nature of the material used and its natural angle of repose. The downstream bank is sodded.

In the great majority of cases there is a central spillway of the drop-inlet or basin type or in the form of a flume on a gentle grade. The first two types are generally built of concrete, sometimes reinforced. The basin type has the advantage that the water coming over the dam falls into a cushion of water, but it cannot be easily increased in height.

The inclined-flume type of spillway is simple and inexpensive. The flume is lined with willow and tamarisk twigs, gravel covered with wire netting and coated with cement mortar, or a 4-inch layer of concrete. Its base is the same earth of which the dam is built. If the dam is raised the flume can be extended to the new level without appreciable change in grade. This type of spillway, like the drop inlet, can be readily raised when necessary to enlarge the catchment basin.

Lateral spillways are sometimes used for moderate discharges where the natural formation at the ends of the dam is solid and other conditions are favorable. A spillway is built at either end of the dam, one of them at a higher level for emergency flows. An unusual method, requiring great finesse, is to build the sodded dam perfectly level and allow the water to spill over its full length.

The standard practice is to start dam construction in the lower reaches of the main waterways, preferably at the junction of two or more tributaries, to insure quick filling of the catchment basins. Progress is upward, ramifying the system to include minor tributaries. Frequently the drainage basin is divided into sectors, each of which is treated as a unit for planning and operations.

As developed in Italy, the shaping of ragged clay slopes is so unique that a fairly detailed description will not be amiss.

The objective of this work is to fill the silt basins, to lower the ridge crests, and to achieve slopes that are stable, tillable, and well-rounded, so that contour cultivation will be possible without introducing fantastic curves. The process is not only a prelude to cultivation but continues long after cultivation is started. It is generally planned with the idea that the slopes must be brought to grades of 20 to 27 percent, depending on the composition of the soil. In addition to the remodeling work itself, there is the provision of dams in the waterways to collect the material washed down from above, followed by the successive raising of the dams to accommodate all the material and aid the process of bringing adjacent slopes to uniform grades. Then, there is the work of the farm laborer who, starting wherever the slope has been sufficiently modified to prevent landslides, works steadily upward to aid reclamation operations. His labors are particularly useful because constant tilling improves the soil.

The remodeling job is started by building ditches down the crests of the ridges, beginning at the top of the eroded amphitheater, inducing erosion to round off the crests and contribute material to the catch basins below. As the ditches deepen, their walls are broken down by hand. Where this method is not practicable, ridges and declivities are demolished by the use of explosives. First, small charges are used to create chambers in which heavy charges can be placed. The best results are achieved if the "mining" starts at the bottom and works upward. The actual tilling of the mined soil generally starts in the third year. Naturally, the water and mining methods are often used in combination.

Essentially the slopes are shaped by three kinds of ditches: Eroding—already described; transporting, i. e., collecting and carrying the water from one part of the slope to another; and regulating, i. e., draining off surplus water and depositing material carried in suspension.

The use of ditches may be divided into two phases, of which the first occurs when the slopes are still very steep, 60 percent or over, and the water must be conducted, not straight down but at grades steep enough to insure the desired amount of erosion and to avoid penetration that might result in landslides. These ditches are usually small and placed close together wherever possible in order to limit the discharge. Ultimately, the system assumes the form of a fish bone, with the spine, or main ditch, on a ridge and leading into

it on the slopes the laterals, with grades of 20 percent to 40 percent, depending on the general slope of the terrain. This phase may cover several years, during each of which the location of the laterals is changed.

The second phase starts when the slopes have reached the desired configuration. Then two series of ditches are introduced, the secondary running more or less at right angles to the main ones and dividing the slopes into four-sided figures containing something like one-fortieth acre each. By this time the catchment basins in the lower waterways have reached the final stage with a canal running from one spillway to the next, dividing each basin into two small fields and draining off the water from the hillside ditches.

PLANNING

As may be seen, the control of erosion in clay lands and putting the lands into productive use is a highly complex task that covers a period of years. As each minor drainage basin is attacked, a control plan is made, but it is impossible to blueprint all the necessary operations in the beginning. The plan must be constantly revised to cope with the unpredictable whims of Nature. Both the initial planning and the subsequent steps require highly competent engineers and agronomists who are prepared to devote substantial parts of their lives to single projects. Success depends, too, on ability to gather together a competent labor force for the engineering work and on the training of a resident group of farmers for the essential task of proper tillage.

PUTTING THE LAND TO WORK

As we have seen, the cultivation of the soil proceeds during the control operations. It is not possible, however, to reach a state of anything like perfection until some time after the first step is taken. That step is to make the raw soil of the remodeling hillsides capable of producing the crops essential to the local economy and the needs of the people. Working and reworking the soil, washing it with ditch water, exposing it to all the weathering agents—water, air, frost, great heat, and drying winds—are necessary and beneficial. Deep plowing of virgin clay lands, in order to hasten the weathering process, assist the plants to contribute organic material, and facilitate the use of fertilizers, is a "must" of Italian agriculture. By these means the permeability of the soil to air and water, as well as its water-holding capacity, is increased.

Among the plants best adapted in the early stages are certain legumes, especially *sulla* (Hedysarium Coronarium L.) and grasses belonging to the genera *Agrostis*, *Bromus*, *Festuca*, and *Agropyron*, which are able to establish themselves more or less spontaneously. They not only contribute organic matter to the soil but also provide feed for the cattle which are the only usable and available draft power for cultivation. Incidentally, the meat provided by the cattle helps to tide over the lean years of scanty crops.

In the first stage it is necessary to use plants which protect the surface and enrich the soil. Nevertheless, it has been found that failure to plow annually, or at least every 2 years, increases the danger of landslides. Sulla and alfalfa, the first because it so easily adapts itself, and the second because of its greater productivity and superior root system, are the legumes that are most favored for early planting.

In the earlier years the farming operations recommended show a strong tendency toward concentrating about equally on leguminous forage crops and cereals with a minimum of the *rinnuovi* which at first consist of horse beans and vetch, replaced in later years by crops like tobacco, sugar beets, hemp, and tomatoes. These are often important sources of income but tend to require both deep plowing and heavy use of manure and artificial fertilizers. The use of these crops is limited to soils which, following reclamation operations, contain a sufficient mixture of sand.

But above all, the successful conquest of the clay hills depends on the human element, on the peasant recruited from the immediate neighborhood, who, in best Italian tradition, is prepared to put all his efforts into nursing the land back to a healthy condition, with a sort of passionate devotion born of love for the soil and the things it can grow. In much of Italy the prevailing system is that of the *mezzadria* in which the large properties are divided into *tenant holdings* of less than 25 to more than 65 acres, and the tenant receives half or more of the crop in return for his labor, and half of current production expenses. While this is not an ideal system it frequently results in a sort of partnership between owner and tenant families which endures through generations. Each *podere*, or tenant holding, is usually occu-

pied by a family group consisting of several brothers and their families, who live with their parents in a house provided by the landowner. As an agent of *sistemazione*, the *mezzadro* has the basic knowledge necessary and a strong incentive under a fair-minded owner, with the benefit of technical advice, to make the land produce. He has the satisfaction of carrying it through the forage, cereal, and *rinnuovo stages* to the point where a substantial part of the farm, if not too clayey, is ready to produce vines and olives or fruit trees. Newly recruited families are small—4 to 5 persons—so that they can make a living while the work proceeds. Old established families may run to 25 members.

In every *bonifica*, as new farms are developed on the eroded hillsides and in the little valleys, it is necessary to build new houses and farm buildings for the tenants. While these houses do not contain all the modern conveniences, they are built according to plan and are as sanitary, commodious, and comfortable as possible under the circumstances. Provision is made for housing farm animals, farm implements, and for storage of produce. Other requirements of each project are schools and health services, water supply, and roads.

In the sticky clay country, roads are a prime necessity. With farm houses isolated for months at a time during the rainy season, sudden cases of illness might easily result in death before a doctor could reach the patient. One of the first moves, therefore, is to start construction of a system of ballasted, graveled roads on easy grades and good alinement, with a road to every farm connecting with the principal arteries. The road system conforms to the bonifica plan; canals are bridged, certain dams are built wide and strong to accommodate traffic, the reclamation work itself is hastened and facilitated. The system grows as the work proceeds. Children have easy access to school, farm produce to market, and supplies to the farm. Seas of mud are no longer a threat to progress and human well-being.

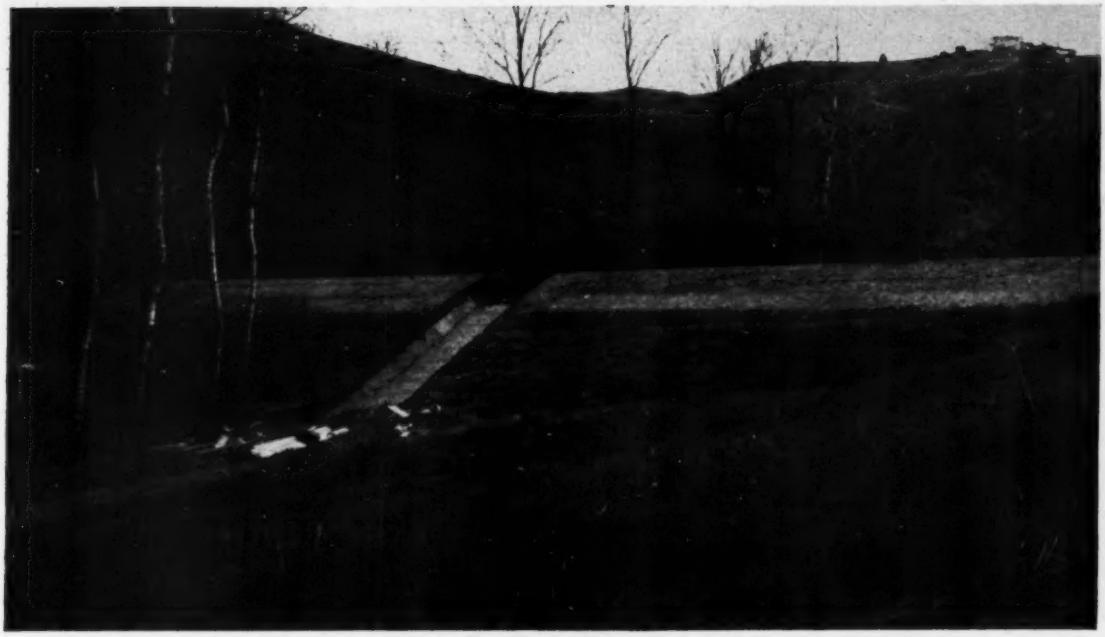
The clay lands are invariably short of permanent sources of water. The provision of water for people presents a problem that must be, and is, solved is various ways. Small dirt reservoirs are built for livestock which, under constant use, provide water until August at the latest. To avoid the necessity of hauling water long distances, rainwater cisterns are built, or if practicable, water is piped from the nearest permanent sources of supply. In short, subject only to the technical and financial resources of each *bonifica*, all the necessities of daily living are provided. Under the best conditions, life in these hills is often more healthy than in the broad valleys and plains.[1]

COSTS AND BENEFITS

An attempt to assess the dollar cost of reclaiming clay lands and putting them to work is likely to produce an accusation that the assessor has pulled figures out of the air. In the first place there is such a wide variation in degree of "degradation" between one area and another that representative figures are well-nigh impossible. Second, the initial outlay by the *Consorzio* and the government are only part of the story; the other part is the never-ending labor of the farmer and the constant public improvements that are contributed throughout the life of the project. Third, the only figures available are prewar, bearing no logical relationship to the present monetary ratio between the lira and the dollar, or to the present costs of materials. Suffice it to say that prewar costs seem entirely in line with benefits to the land proprietors, tenants, and the Nation, and that, anyway, the work must go on if Italy is to survive. To abandon or even slow up work on the clay lands would mean not only a constantly diminishing area of tillable soil but an increasing threat to irrigation, drainage, health, and waterpower development.

Within any approved project, or *bonifica*, existing law provides that the national government may contribute the full cost of hydraulic systemization (dams, ditches, canals, etc.) and of reforestation; 75 percent of the cost of roads intended for public use (30 percent for farm roads) and 25 percent of other costs, including houses, land improvement, sanitary and water services. The *Consorzio*, composed of landowners, acting in cooperation with the government, is, to all intents and purposes, a public agency which must plan and execute the work, provide instruction and technical assistance to farmers, handle the finances and, in short, assume full responsibility to the State and the public for the success of the undertaking.

[1] Population of reclaimed clay lands ranges from 130 per square mile in Tuscany to 360 in Marche.



Earth dam with flume outlet lined with prefabricated concrete pieces used in the Val d'Era Zone. A recent elevating of the crest may be noticed. (Photo by Val d'Era Reclamation Consortium.)

The benefits of the work are many and varied. Sometimes completely unproductive land is brought into use. More often it is a matter of better and more profitable use. Poor grazing lands for sheep are transformed into good pastures for work, milk, and meat animals, with greatly increased animal-carrying capacity. More land is provided for grain and other food crops, with an assurance of constantly better production through better cultivation and rotation systems. Large farms are divided into a number of small ones, with better working conditions and improved opportunities for a living. In typical cases, returns to the landowner have increased from 100 to 300 percent.

From the standpoint of the worker the opportunities for improvement are many. He has the benefit of technical help and instruction; his work becomes easier, more varied, and better distributed throughout the seasons. He acquires more work and draft animals and has more contacts with the social life of neighboring towns and villages. It becomes possible to provide outlets for members of family groups that have grown excessively large; some of the sons become tenants and heads of families in their own right instead of farm laborers. There are new chances for migration from overpopulated zones to newly developed lands. The people live in better houses, have decent water to drink, access to medical services, and the pleasure of expanding their meager diet to include more meat and poultry, wine, olive oil, and vegetables. Such benefits cannot be measured in cold cash.

As for the general benefits, it is even harder to achieve concrete expression. It is highly significant, however, that the laws of the Nation permit a heavy public contribution to the work of amelioration and that national planning, insofar as it has developed since the war, tends strongly in the direction of reclamation and repair of damaged resources. Italy's economists and agricultural scientists have been quick to grasp the situation.

THE FUTURE

The clay lands of Italy, making up over one-fifth of her total land area, are by no means her only land problem. Throughout the country, and especially in the hills and mountains, there are many and diverse needs of better land and water use. The clay lands, however, present the most dramatic and spectacular examples of deterioration, proceeding at a more rapid rate than in any of the other formations.

To say that only a small beginning has been made in attacking this great problem is no exaggeration. The problem exists in all parts of the country, but in only a few regions has the corrective work been adequately organized. The work which has been done, however, has two great values: It has furnished a long-term proving ground on which to test methods of control and demonstrate measures of proved value. The projects themselves furnish an important basis of education to farmers in the surrounding territory. They also provide an excellent opportunity for a much-needed extension of research activities designed to lay the groundwork for improvement and refinement of the methods now in use.

Italy, like all of Europe at this moment, is deeply concerned with the necessity of increasing its food supplies and doing everything possible to provide a more secure and satisfying life for its people. Whatever her financial resources may be, the Nation cannot afford to delay the start of an action program that will assign high rank to the better use and conservation of its soil and water resources. She has the scientific know-how, backed by over a century of experience. Every dollar spent will be an investment which may be expected to bring both immediate and long-enduring returns.

ONE DAY—OR FIVE YEARS?

By AUSTIN L. PATRICK*

MANY FARMERS who attend face-lifting events are overwhelmed by the vast amount of heavy equipment and the large number of workers used in establishing a complete farm conservation plan in 1 day. They are likely to conclude that a complete plan "costs too much," "is too rich for our blood," or "our pocketbooks won't stand the strain."

This isn't so at all, says the Maryland Chapter, Friends of the Land, in its current report reviewing the 1-day miracle sponsored by the Frederick County Pomona Grange and witnessed by at least 40,000 farmers and others at the 175-acre Nellie Thrasher farm near Frederick, Md.

A detailed analysis of the equipment and labor used there, and the cost and time involved, shows that installation of the same complete farm plan over a 5-year period—the average course for such a job on an average farm—under normal conditions would cost a farmer only $3,940.55 in cash outlay, if he provided the labor and machinery to do all except the work requiring heavy equipment.

Over 5 years, the outlay averages $781.11 annually. But it is emphasized, this $3,940.55 includes a cash expenditure of $2,145.55 for lime, fertilizer, and seed—a "normal expense for anyone doing a good job of farming." This means that the actual extra cash outlay in establishing a complete farm conservation plan just like the Thrasher plan is only $1,795, or $359 per year on a 5-year basis.

The total $3,940.55 cash outlay in 5 years, is composed of the following general items:

Heavy-equipment work (This covers the work that a farmer ordinarily would not do with his farm equipment and labor, such as building the pond and 3,700 feet of diversions, filling the barn lot, grading the farm road, burying stone in fence rows and building outlets.)	$1,305.00
Dynamiting ditch	50.00
Fencing material, 650 rods	440.00
Lime, 43 tons ground and 18 tons ground burnt	493.75
Fertilizer, 23 tons 3–12–6 and 2½ tons superphosphate	950.12
Seed, 1,364 pounds (Orchard grass, alsike clover, timothy, domestic ryegrass, Ladino, white Dutch clover, bluegrass, alfalfa.)	701.68

In the provision for the farmer to furnish the labor and farm machinery to do all except the heavy-equipment work, as noted in the preceding distribution of costs, establishment of the complete plan over a 3- to 5-year period, the report says, "would not interfere with normal farm operations. No additional labor would need to be hired and the only cash outlay required would be for field and other normal expenses in connection with farm machinery. Labor would be used on conservation work when other farm work did not demand undivided attention."

On a cash basis, the work which the farmer would do with his farm labor and farm machinery would represent $1,014.50, broken down as follows:

NOTE.—The author is regional conservator, Soil Conservation Service, Upper Darby, Pa.

Labor (686 hours at 75 cents per hour) (This covers such work as fence removal; loading stones, lime and fertilizer; seeding grass and legumes; fence construction and miscellaneous jobs.)	$514.50
Farm machinery (200 hours) (Cost per hour of tractor and equipment and operators, $2.50. The work done would be equivalent to what was done at the Thrasher farm by 43 farm tractors, 5 two-B plows, 7 bush and bog harrows, 8 post-hole diggers, 10 lime spreaders, 4 disk harrows, 3 spring-tooth harrows, 5 disc drills, 5 grain drills, 2 cultipackers, 11 cyclone seeders, 2 wheatland plows, and 1 each of the following pieces of equipment: tractor disc, three-B plow, field cultivator, crawler tractor, large cultipacker, rotary terracer, weeder, disc tiller, and orchard cultivator.)	500.00

The complete farm conservation plan covered by the 1-day activities at the Trasher farm included 72 acres contour-stripped; 3,700 feet of diversions; 59 acres of new rotational pasture, seeded, limed, and fertilized; 20 acres of pasture treated; 363 rods of old fence removed, 650 rods of new contoured fence built; and an acre (1.5 million gallons) farm pond for which 2,500 cubic yards of earth were excavated. Gullies were sloped and seeded and waterways were installed. Multiflora rose was planted as a living fence and woodland and wildlife management programs were started. In the operation, 61 tons of lime, 25½ tons of fertilizer, and 1,364 pounds of seed were used.

If the installation of the whole farm conservation plan were to be spread over a 5-year period, the report suggests that the annual cash outlay could be controlled this way:

First year	$866.00
Second year	849.55
Third year	945.00
Fourth year	727.00
Fifth year	553.00
Total	3,940.55

On this same 5-year installation plan, the work done annually could be distributed like this:

First year: Establish contoured strips on third of cropland, plant to corn and seed wheat and grass in fall and clover the next spring; remove stone walls; build contoured fence; seed combined fields with hay-pasture mixture; seed hay-type pasture; construct sod waterways in three fields; start selective cutting for fuel wood and building lumber; and blast ditch.

Second year: Build diversion in one field; install contoured furrows, prepare seedbed, and lime, fertilize, and seed one field with hay-pasture mixture; plow and plant to corn about one-third more of contoured strips, seeded to wheat in fall; complete seeding hay-type pasture in one field; build fence between two fields, and continue selective cutting in woods.

Third year: Plow balance of three contoured strips, plant to corn and seed as in previous years; build diversions and sod waterways; remove old and build new fence; prepare, lime, fertilize, and seed field to hay-pasture mixture; continue selective cutting in woods, completing about half of proper cutting in one field, and plant half of multiflora rose hedge fence between two fields.

Fourth year: Build farm pond; lime and fertilize pasture; build fence between three fields; continue work in woods; plant balance of multiflora rose between three fields, and plant Reed canary grass.

Fifth year: Lime and fertilize field; complete selective cutting in woods; plant multiflora rose along streambank; fill in barn lot; complete farm road grading and build fence around barn lot.

Incidentally, the total cash expenditure by the organization that staged the Thrasher farm face lifting was $17,179.47. This covers more than the cash expenditures in installing the complete farm conservation plan in 1 day, because it includes the expenditures for modernization work done in and around the farm home ($648.41) and the building of the new dairy barn and milk house ($6,417.26). It includes administrative and promotional costs of more than $4,600, but does not include the value of materials, services, and labor donated.

This $17,179.47 was contributed by city and county industrial and commercial organizations, city and county banks, county government, Mrs. Thrasher ($1,000), lumber dealers and processors, Izaak Walton League, American Plant Food Council, a farm organization, the State Soil Conservation Committee, and the Maryland Chapter, Friends of the Land, which alone contributed $8,097.20, almost half of the total.

Is such an expenditure worth while in advancing soil conservation, and can it be justified by the results? These are questions that people sometimes ask. John Ball, farm editor of the *Washington* (D. C.) *Post*, who has followed the Thrasher demonstration closely, gives one answer in a recent news story. Commenting on a visit made to the farm 8 months afterward, he wrote:

"The Thrasher farm has become a sight-seeing attraction rivalling two other Frederick County spots . . . the old home of Francis Scott Key and the Barbara Fritchie house. Visitors to this masterpiece of soil conservation have become a daily affair, averaging 40 to 50 a day, with more on Saturdays and Sundays. Many tours have been arranged, especially from neighboring counties, with 4-H Clubs, Future Farmers of America, veterans groups and schools in charge. Some groups don't even bother to make advance arrangements.

"The road to the Thrasher farm shows the influence of the face lifting. Virtually every farm along it shows some conservation activity. Carl Ingling, SCS district conservationist, who had much to do with the face lifting, and his crew are busy at other farms. The Thrasher farm looks entirely different. There are a few bare spots—where vegetation is finding trouble growing because of shaving too close to topsoil—but generally the site is attractive. The mountainside, where a year ago dust was raised by every eddy of wind, is lush with pasture."

There is another answer in the Maryland Chapter, Friends of the Land report. It says:

"The Thrasher farm is being maintained as a 'conservation masterpiece.' The farm was made over in a single day, but it was not expected that the farmer would change so abruptly. . . . The field day organization recognizes its responsibilities. A committee, including the district conservationist for Soil Conservation Service, the county school agricultural teacher, several successful practical conservation farmers, and the county agent, is working with and advising Mrs. Thrasher in management. A simplified bookkeeping system has been set up to follow the dollars-and-cents progress. A reappraisal of the farm will be made periodically. To what extent the face lifting will materially advance the cause of conservation in Maryland will be determined by what happens on the acreage next year and for some years thereafter."

SCIENCE STUDIES A GULLY

(*Continued from page 13*)

and in 13 years (1936–49) 60,226 cubic feet was lost.

When these volumes are applied to the surface area of the gully, 30,000 square feet, they represent an average soil-loss rate for the first year of 1.19 inches; for the next 2 years, 1.70 inches; and for the next 10 years, 1.94 inches. The average for the entire 13 years was 1.85 inches per year.

Put another way, the sediment produced by this one gully during the 13 years would completely fill a normal small-stream channel 3 feet deep and 10 feet wide a distance of 2,000 feet. When this volume of sediment is multiplied by the thousands of similar gullies present in this area, the extreme seriousness of the problem can be realized.

The Soil Conservation Service is now carrying out a program of flood-control operations in the Little Tallahatchie River watershed under authorization of the Flood Control Act of 1944. One of the major objectives is control of gully erosion in order to alleviate flood and sediment damages in the bottom lands. Earthen-dam debris basins are being installed in or just below many of the larger gullies to trap sand until kudzu planted in the gullies can stabilize the slopes. Complete stabilization generally takes 5 to 10 years. In terms of designing debris basins, these data show that during the last 10 years about 1 acre-foot of capacity would be needed for every 6 acres of gully area every year which the debris basin was expected to function.

NOTES FROM THE DISTRICTS

DUCKS ON THE PONDS.—A new move to rehabilitate native waterfowl population has been undertaken by the Bureau of Game, New York State Conservation Department, in cooperation with the Allegany County Soil Conservation District. Mallard ducks have been placed on the farms of more than a dozen district cooperators by the bureau. Distribution is restricted to those which are suitable for waterfowl management programs. Ducks also have been placed on ponds at two colleges and on Rod and Gun Club, County Reforestation, and Boy Scout Council ponds. The public has been requested to "leave the ducks alone," so they will nest and raise families.

TALL TALE ABOUT KUDZU.—Rad Bailey, SCS man at Tarboro, N. C., tells about a trip he made in Edgecombe County with an SCS nursery manager:

"We saw some kudzu," Bailey recounts. "It had that old, steep, clay hillside blanketed knee-deep in as tasty grazing as ever a cow wrapped tongue around.

"So far, so good. Then this farmer friend told how one of his calves got his tail cut off, how he put a kudzu poultice on the stub, and how that calf grew a new tail!

"Now I am a great believer in the powers of kudzu. I've seen it heal raw gullies, road cuts, and the like. I've seen it used in canned baby food. Thus, I was prepared to believe the story about the calf and the new tail. What got me wondering, though, was my friend's saying that he put another kudzu poultice on the tail and grew a new calf!"

LIVE-WIRE IDEA.—Since 1943 C. P. Mayhugh, SCS conservation aid in the Shelby County Soil Conservation District, Harlan, Iowa, has been using steel wire, instead of lath, for stakes for laying out terraces, waterways, contour lines, field divisions, diversions and strip cropping. The idea has spread to a number of other work units.

The wire is cut in 2- to 3-foot lengths, depending on where it is to be used. One end is bent into a loop to which is tied colored bunting. The technician simply carries a handful of these wire stakes and jabs them into the ground as he makes the lay-out. The farmer usually can pull them as he plows out the lines.

Mayhugh's unit used salvaged material from the local REA office. That office saves short pieces of brace cable (called messenger wire) which it cannot use. The cable consisted of seven strands of steel galvanized wire of about No. 9 gage. The wire must be stiff enough so that it will not buckle readily. The salvaged cable, after being cut into desired lengths, was turned over to the local vocational agriculture instructor. He, in turn, had his shop class unbraid the cable, straighten out the kinks and make loops for holding the bunting.

No. 9 all-steel galvanized wire comparable to the messenger cable wire can be purchased for about 12 cents per pound. It runs an average of 55 feet per pound. With 3 feet per stake, 1 pound of wire will provide 18 stakes, at a cost of two-thirds of a cent per stake. A bundle of 50 laths costs $1.25, or 2½ cents per lath.

Use of wire makes it unnecessary to carry laths, hatchet, knapsack, and other equipment. The time used in sharpening stakes is eliminated. Physical exertion also is saved, since there is no picking up and laying down of armsful of laths at each station. Lay-out work is speeded because 50 to 75 stakes can be carried in one hand easier than a lath and a hatchet.

Mayhugh's steel-wire stake idea has resulted in saving a full hour of technical time per day during lay-out seasons. On the basis of 20 percent of technical time spent on application, the saving amounts to approximately 7 mandays per year per work unit.

Wire stakes permit working under conditions where laths are impracticable. Many soil conservation and contour training schools have been held in the Shelby County Soil Conservation District during winter when the ground was frozen. A crack in the ground could always be found for putting in wire stakes. This was not true of laths.

Using different colored bunting on the wire stakes avoids the possibility of confusing one line of stakes with another.

TEXANS HONORED.—Plaques were presented in each of the five soil conservation district State subdivisions in Texas by the Fort Worth Chapter of the Soil Conservation Society of America for unselfish service to soil conservation by persons not farmers.

Dr. R. F. McCasland, of Tulia, Tex.; Hiram Phillips, editor, *Texas Sheep and Goat Raisers Magazine*, San Angelo, Tex.; E. W. Wehman, tractor dealer, Pleasanton, Tex.; O. H. Clark, banker, Marshall, Tex.; and Jim Cantrell, banker, Princeton, Tex., received the awards.

The occasion was the annual "Save the Soil and Save Texas" program organized by the *Fort Worth Press* and other Scripps-Howard papers in Texas.

WANT TO ENTER?—The 1949 National Plow Terrace Contest will be held September 20 on the J. Howard and Gilbert Peterson farm near West Point, Nebr. Entries are desired from all parts of the United States where terraces are built with moldboard plows.

It is the fourth annual contest, the first having been held near Marion, Iowa; the second near Weeping Water, Nebr.; and the third near Harlan, Iowa. Although most of the entries thus far have come from Kansas, Iowa, Nebraska, and South Dakota, contestants have come from as far east as Indiana and as far south as Mississippi.

Winner in 1946 was Norman Hull of Syracuse, Nebr.; and in 1947, Louis Buessing of Baileyville, Kans., won the award. Last year's winner was John Stroburg of Blockton, Iowa.

Sponsors are the World-Herald, the Chamber of Commerce and Farm Equipment Club of Omaha, and the West Point Chamber of Commerce. Cooperating are the Cuming County (Nebr.) Soil Conservation District, the Nebraska State Soil Conservation Committee, the Nebraska Extension Service, and the Soil Conservation Service.

Prospective entrants should communicate with John Lubker, Jr., of West Point, chairman of the general contest committee, or with Jim McDougal, extension conservationist and chairman of the publicity committee, College of Agriculture, Lincoln, Nebr.

MONEY AND MEN.—The 1949 session of the New Mexico State Legislature passed two measures of considerable importance to the State's soil conservation districts.

One bill appropriated $20,000 out of the general funds to be used by the New Mexico Soil Conservation Committee in purchasing equipment for conservation districts whose credit requires the guaranty of the State committee.

Under the other bill membership of the State conservation committee was increased from 7 to 11. In addition to the 7 members to be appointed by the governor, ex-officio members will include the director of the State Extension Service, director of the State agricultural experiment station, the governor himself, and one member appointed by the United States Secretary of Agriculture.

The first seven appointees will include five soil conservation district supervisors and two members selected at large from among individuals interested in agriculture and soil conservation.

SYSTEM MODERNIZED.—The Cottonwood Ditch Irrigation System, one of the oldest in Arizona and in use in the 1880's, has been completely reconditioned at a cost of $42,000, as a community enterprise in which several organizations figured.

Officials of the ditch system obtained a water-facilities loan from the Farmers Home Administration, which also furnished engineering assistance. W. G. Glover, SCS engineer assisting the Bridgeport Soil Conservation District, helped in overhauling the ditch system.

The 6½-mile Cottonwood ditch starts on the Verde River above Cottonwood and extends past Bridgeport, furnishing water for 750 acres included in 50 farms. In recent years flumes had worn out, and costly repairs had to be made in the middle of the irrigation season.

Now, wooden flumes have been replaced by concrete structures and inverted siphons of concrete pipe. Through the lower part of the town of Cottonwood, 400 feet of open flume have been replaced with buried concrete pipe to eliminate risk of children being drowned. Manholes have been installed to facilitate pumping of water for fire protection.

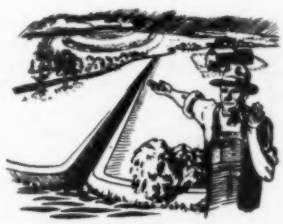
Completion of the project will enable farmers of the fertile Verde Valley to increase crop production by protecting their soil and making more efficient use of irrigation water.

The FHA loan will be repaid in yearly installments over a 30-year period.

SHORT COURSE.—Soil conservation is becoming a regular study in the schools of Washington County, Utah, through the efforts of Milton E. Moody, county superintendent, and N. R. Frei, principal of the Woodward Junior High School at St. George.

In the last 2 years Principal Frei has obtained conservation teaching publications from the Soil Conservation Service and Forest Service for his classes, and also has published several conservation articles in the school paper for use by students.

Recently, Superintendent Moody and Principal Frei announced that they have formulated a course of study for the next school year in which the teaching of conservation will become a regular part of the Social Study Series.



WATERS TAMED.—Latah Soil Conservation District (Idaho) farmers completed nearly 18 miles of carefully planned drainageways last year and plan to develop as much again in 1949.

Setting for the current drainageway program is the high-producing grainlands in the Genesee, Moscow, and Potlatch areas. Here seasonal runoff on upland fields and bottom lands is being routed through man-made watercourses and newly reshaped natural gullies.

Farmers like Nels Lande, Fred Hove, Lee Ernst, and Jess Johnson, all of Genesee, who have enlarged more than 2 miles of Cow Creek to carry off flood waters, know the value of good drainageways.

"Runoff water has to go somewhere and the old creek channel was not large enough to carry it," Lande observes. "Until the Latah District was voted in by local farmers 8 years ago, few of the drainageways in our area were designed along soil conservation lines."

U. S. GOVERNMENT PRINTING OFFICE: 1949